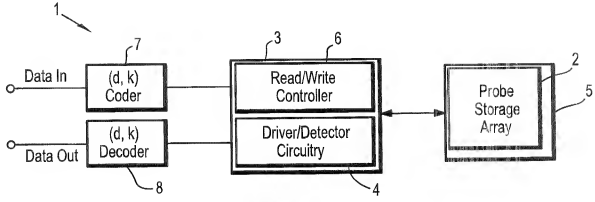

FIG. 1

write areas (wa = 1)

spare bit

Bit Positions i:	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Old data d_i :	1	0	1	0	0	1	0	0	0	1	0	1	0	0	1	0	
Coded data b_i :	0	0	0	0	1	0	1	0	0	1	0	0	1	0	0	0	
reads:	R	-	-	-	-	R	-	R	R	-	R	R	-	R	R	-	
writes:	-	W	W	W	W	-	W	-	-	W	-	-	W	-	-	W	W

write results

i = 1:	0	**1**	0	0	0	1	0	0	0	1	0	1	0	0	1	0	
i = 2:	0	0	**1**	0	0	1	0	0	0	1	0	1	0	0	1	0	
i = 3:	0	0	0	**1**	0	1	0	0	0	1	0	1	0	0	1	0	
i = 4:	0	0	0	0	**1**	0	0	0	0	1	0	1	0	0	1	0	
i = 6:	0	0	0	0	1	0	**1**	0	0	1	0	1	0	0	1	0	
i = 9:	0	0	0	0	1	0	1	0	0	**1**	0	1	0	0	1	0	
i = 12:	0	0	0	0	1	0	1	0	0	1	0	0	**1**	0	1	0	
i = 15:	0	0	0	0	1	0	1	0	0	1	0	0	1	0	0	**1**	
i = 16:	0	0	0	0	1	0	1	0	0	1	0	0	1	0	0	0	**1**

FIG. 3

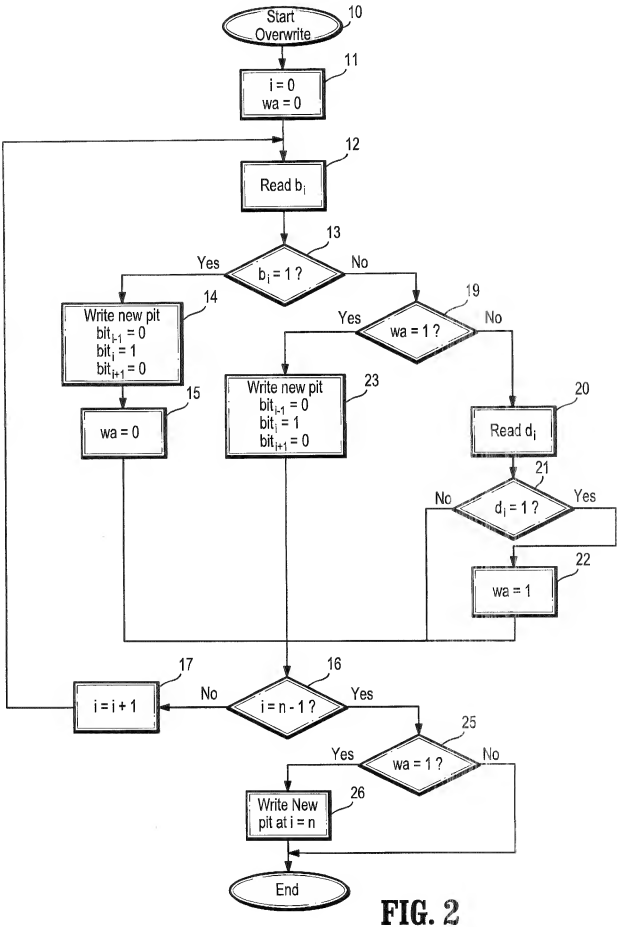
Start Overwrite
10
i = 0
wa = 0
11
Read b_i
12
$b_i = 1$?
13
Yes
No
Write new pit
$bit_{i-1} = 0$
$bit_i = 1$
$bit_{i+1} = 0$
14
wa = 0
15
wa = 1 ?
19
Yes
No
Write new pit
$bit_{i-1} = 0$
$bit_i = 1$
$bit_{i+1} = 0$
23
Read d_i
20
$d_i = 1$?
21
No
Yes
wa = 1
22
i = i + 1
17
i = n - 1 ?
16
No
Yes
wa = 1 ?
25
Yes
No
Write New pit at i = n
26
End

FIG. 2

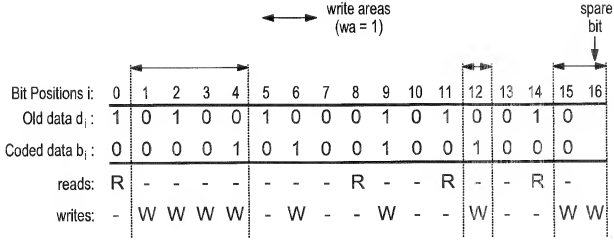
write areas
(wa = 1)
spare
bit
Bit Positions i: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Old data d_i : 1 0 1 0 0 1 0 0 0 1 0 1 0 0 1 0
Coded data b_i : 0 0 0 0 1 0 1 0 0 1 0 0 1 0 0 0
reads: R - - - - - - - R - - R - - R -
writes: - W W W W - W - - W - - W - - W W

FIG. 4

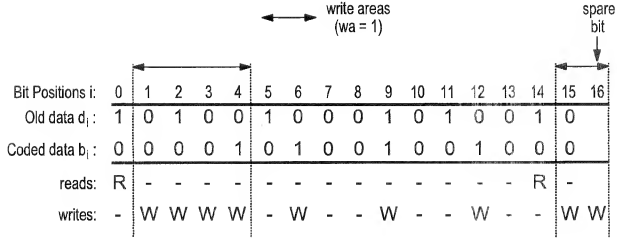
write areas
(wa = 1)
spare
bit
Bit Positions i: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Old data d_i : 1 0 1 0 0 1 0 0 0 1 0 1 0 0 1 0
Coded data b_i : 0 0 0 0 1 0 1 0 0 1 0 0 1 0 0 0
reads: R - - - - - - - - - - - - - R -
writes: - W W W W - W - - W - - W - - W W

FIG. 6

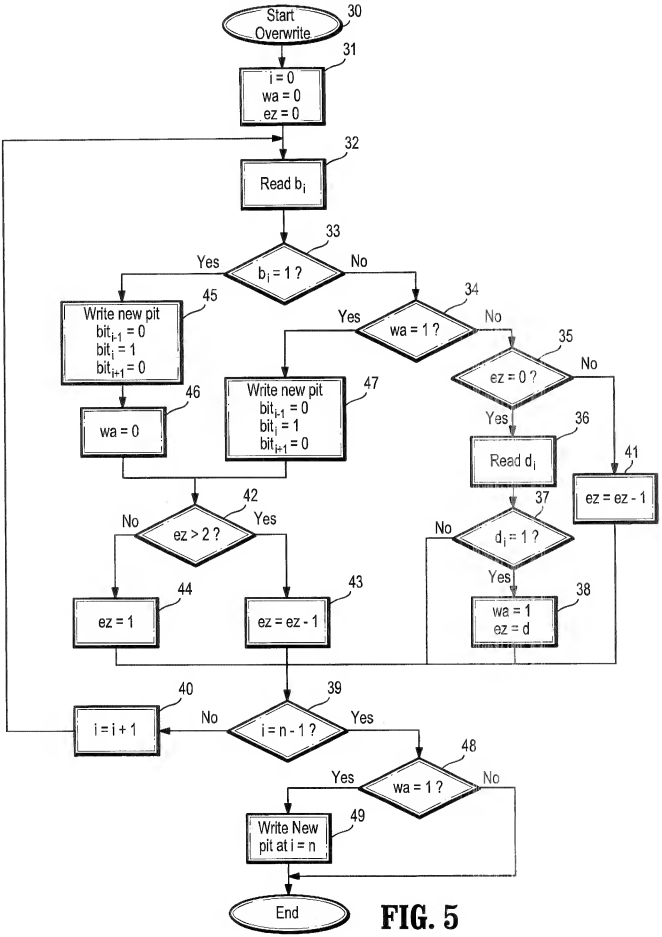
Start Overwrite
30
i = 0
wa = 0
ez = 0
31
Read b_i
32
b_i = 1 ?
33
Yes
No
Write new pit
bit_{i-1} = 0
bit_i = 1
bit_{i+1} = 0
45
wa = 0
46
wa = 1 ?
34
Yes
No
Write new pit
bit_{i-1} = 0
bit_i = 1
bit_{i+1} = 0
47
ez = 0 ?
35
No
Yes
Read d_i
36
ez = ez - 1
41
d_i = 1 ?
37
No
Yes
wa = 1
ez = d
38
ez > 2 ?
42
No
Yes
ez = 1
44
ez = ez - 1
43
i = i + 1
40
i = n - 1 ?
39
No
Yes
wa = 1 ?
48
Yes
No
Write New pit at i = n
49
End

FIG. 5

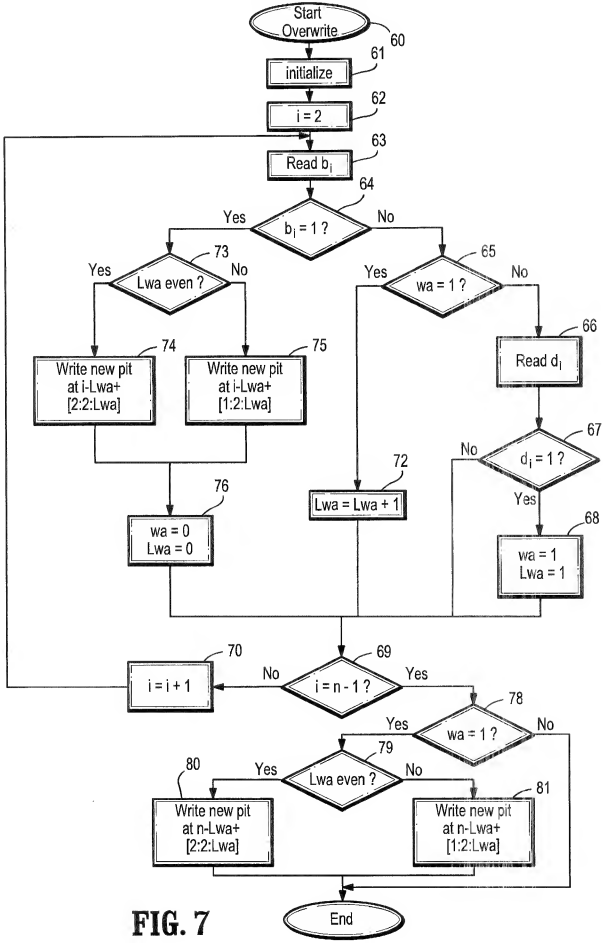
Start Overwrite
60
initialize
61
i = 2
62
Read b_i
63
b_i = 1 ?
64
Yes
No
Lwa even ?
73
Yes
No
wa = 1 ?
65
Yes
No
Write new pit at i-Lwa+ [2:2:Lwa]
74
Write new pit at i-Lwa+ [1:2:Lwa]
75
Read d_i
66
d_i = 1 ?
67
No
Yes
Lwa = Lwa + 1
72
wa = 0
Lwa = 0
76
wa = 1
Lwa = 1
68
i = i + 1
70
i = n - 1 ?
69
No
Yes
wa = 1 ?
78
Yes
No
Lwa even ?
79
Yes
No
80
Write new pit at n-Lwa+ [2:2:Lwa]
Write new pit at n-Lwa+ [1:2:Lwa]
81
End

FIG. 7

write areas (wa = 1) | spare bit

Bit Positions i:	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Old data d_i :	1	0	0	1	0	0	0	0	1	0	0	0	1	0	0	1	
Coded data b_i :	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	
reads:	R	-	-	-	-	-	R	R	R	-	R	R	-	R	R	R	
writes:	-	W	-	W	-	W	-	-	-	W	-	-	W	-	-	-	W

write results

i = 1:	0	**1**	0	0	0	0	0	0	1	0	0	0	1	0	0	1	
i = 3:	0	0	0	**1**	0	0	0	0	1	0	0	0	1	0	0	1	
i = 5:	0	0	0	0	0	**1**	0	0	1	0	0	0	1	0	0	1	
i = 9:	0	0	0	0	0	1	0	0	0	**1**	0	0	1	0	0	1	
i = 12:	0	0	0	0	0	1	0	0	0	1	0	0	**1**	0	0	1	
i = 16:	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	**1**

FIG. 8

write areas (wa = 1) | spare bit

Bit Positions i:	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Old data d_i :	1	0	0	1	0	0	0	0	1	0	0	0	1	0	0	1	
Coded data b_i :	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	
reads:	R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	R	
writes:	-	W	-	W	-	W	-	-	-	W	-	-	W	-	-	-	W

FIG. 10

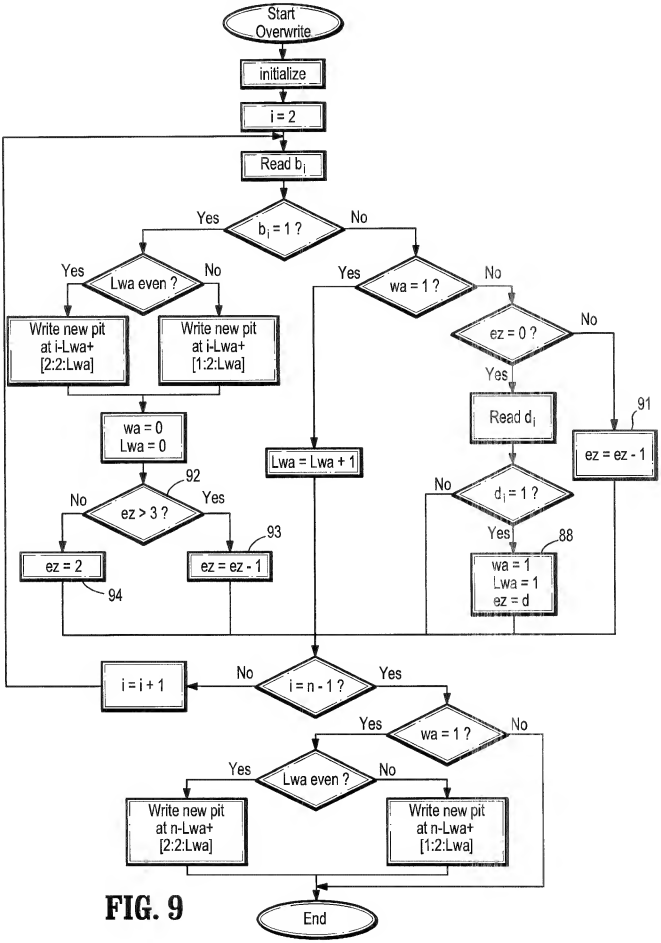
Start Overwrite
initialize
i = 2
Read b_i
b_i = 1 ?
Yes
No
Lwa even ?
Yes
No
Write new pit at i-Lwa+ [2:2:Lwa]
Write new pit at i-Lwa+ [1:2:Lwa]
wa = 0
Lwa = 0
92
ez > 3 ?
No
Yes
ez = 2
94
93
ez = ez - 1
wa = 1 ?
Yes
No
Lwa = Lwa + 1
ez = 0 ?
No
Yes
Read d_i
91
ez = ez - 1
d_i = 1 ?
No
Yes
88
wa = 1
Lwa = 1
ez = d
i = i + 1
No
i = n - 1 ?
Yes
wa = 1 ?
Yes
No
Lwa even ?
Yes
No
Write new pit at n-Lwa+ [2:2:Lwa]
Write new pit at n-Lwa+ [1:2:Lwa]
End

FIG. 9

Code:	(1, 3)	(2, 10) code 1	(2, 10) code 2
N_w	0.41	0.38	0.37
N_r	0.22	0.42	0.41
$N_{method2}$	0.44	0.61	0.57
N_{code}	0.37	0.2	0.22

FIG. 11

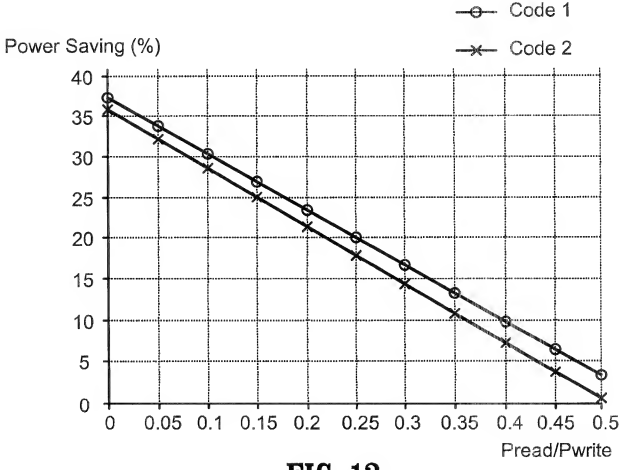

FIG. 12

Code:	(2, 10) code 1	(2, 10) code 2
N_{w2}	0.24	0.25
N_{r2}	0.29	0.26
$N_{method3}$	0.3	0.29
N_{code}	0.2	0.22

FIG. 13

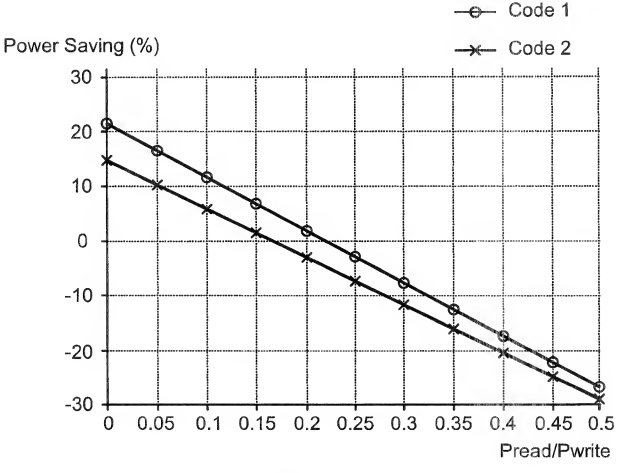

FIG. 14